

IN THE CLAIMS:

Please substitute the following claims for the same-numbered claims in the application:

1. (Currently Amended) A method for reliably storing and updating data blocks on a disk array, said method comprising:

writing ~~[[a]]~~ at least one data block of said data blocks to a first disk of ~~be stored in~~ said disk array;

asynchronously with said writing to said first disk, storing at least one redundant data block corresponding to said at least one data block in at least one spare disk of said disk array;

~~combining an address of said data block with a set of retrievable addresses;~~

~~periodically computing a function of said data to be stored in said disk array to produce a computation;~~

maintaining a directory of updated data blocks, said updated data blocks comprising ones of said data blocks that have received a write operation and a corresponding write operation to a corresponding redundant storage block has not been made;

predicting if said first disk will fail; and

~~storing said computation on at least one spare disk;~~

~~identifying data blocks of said data blocks that have not been updated recently relative to other data blocks of said data blocks that have been updated recently;~~

if said first disk failure is predicted to fail in said disk array, only updating said redundant storage blocks corresponding to said updated data blocks ~~computation using said set of retrievable addresses to recompute only altered portions of said computation and updating said data blocks, wherein said updating of said data blocks comprises updating said data blocks that have not been updated recently prior to updating said data blocks that have been updated recently; and~~

~~deleting said set of retrievable addresses.~~

2. (Currently Amended) The method according to claim 1, ~~all the limitations of which are incorporated herein by reference,~~ wherein said maintaining of said directory is based on a function ~~disk failure includes disk failures that are predicted to occur.~~

3. (Currently Amended) The method according to claim 2 [[1]], ~~all the limitations of which are incorporated herein by reference,~~ wherein said function comprises a mathematical function.

4. (Currently Amended) The method according to claim 2 [[1]], ~~all the limitations of which are incorporated herein by reference,~~ wherein said function comprises an error correcting code.

5. (Currently Amended) The method according to claim 1, ~~all the limitations of which are incorporated herein by reference,~~ wherein said address of said data block comprises said maintaining of said directory comprising maintaining an address of [[a]] said data blocks corresponding to ~~portion of the computed function and said set of retrievable addresses~~ comprises a set of addresses of said redundant data blocks that require ~~describe portions of the computed function requiring~~ updating.

6. (Currently Amended) The method according to claim 1, ~~all the limitations of which are incorporated herein by reference,~~ wherein said disk array comprises at least one a RAID array.

7. (Currently Amended) The method according to claim 1, ~~all the limitations of which are incorporated herein by reference,~~ further comprising reconstructing data stored on a failed disk onto at least one replacement disk.

8. (Currently Amended) The method according to claim 1, ~~all the limitations of which are incorporated herein by reference,~~ wherein said steps of updating and deleting are skipped if said ~~set of retrievable addresses~~ wherein if an amount of said updated data blocks exceeds a fraction of said data stored in said disk array, said method further comprises only updating said redundant storage blocks corresponding to said updated data blocks.

9. (Currently Amended) The method according to claim 1, ~~all the limitations of which are incorporated herein by reference~~, wherein ~~altered portions of said computed function are updated~~ whenever a load on said disk array is below a threshold value, said method further comprises only updating said redundant storage blocks corresponding to said updated data blocks.

10. (Currently Amended) The method according to claim 1, ~~all the limitations of which are incorporated herein by reference~~, wherein ~~altered portions of said computed function further comprising preferentially updating redundant data blocks~~ that are less likely to be altered again ~~are preferentially updated.~~

11. (Currently Amended) A method of reducing data loss in a disk array, said method comprising:

periodically storing redundant data into data blocks located on a spare disk;

monitoring disks in said disk array for predicted disk failures;

determining which of said data blocks comprise updated data blocks, said updated data blocks comprising ones of said data blocks that have received a write operation and a corresponding write operation to a corresponding redundant storage block has not been made; and

if a first disk is predicted to fail in said disk array, only updating redundant storage blocks corresponding to said updated data blocks of said first disk ~~contain altered redundant data,~~ wherein ~~said altered redundant data comprises at least a portion of said redundant data that has been altered subsequent to an immediate previous time said redundant data was stored;~~

~~recomputing said altered portions of said redundant data to produce recomputed altered portions;~~

~~storing said recomputed altered portions in said data blocks;~~

~~updating said data blocks with altered redundant data when said disk failures have occurred;~~

~~identifying data blocks of said data blocks that have not been updated recently relative to other data blocks of said data blocks that have been updated recently; and~~

~~on a disk failure in said disk array, updating said data blocks, wherein said updating of said data blocks comprises updating said data blocks that have not been updated recently prior to updating said data blocks that have been updated recently.~~

12. (Currently Amended) The method according to claim 11, ~~all the limitations of which are incorporated herein by reference,~~ wherein said maintaining of said directory is based on a function ~~disk failure includes disk failures that are predicted to occur.~~

13. (Cancelled).

14. (Currently Amended) The method according to claim 11, ~~all the limitations of which are incorporated herein by reference,~~ wherein said disk array comprises at least one a RAID array.

15. (Currently Amended) The method according to claim 11, ~~all the limitations of which are incorporated herein by reference,~~ further comprising reconstructing data stored on a failed disk onto at least one replacement disk.

16. (Currently Amended) The method according to claim 11, ~~all the limitations of which are incorporated herein by reference,~~ ~~wherein said steps of updating and deleting are skipped if said set of retrievable addresses~~ wherein if an amount of said updated data blocks exceeds a fraction of said data stored in said disk array, said method further comprises only updating said redundant storage blocks corresponding to said updated data blocks.

17. (Currently Amended) The method according to claim 12, ~~all the limitations of which are incorporated herein by reference,~~ ~~wherein said data blocks containing altered redundant data are updated~~ whenever the load on the disk array is below a threshold value, said method further

comprises only updating said redundant storage blocks corresponding to said updated data blocks.

18. (Currently Amended) The method according to claim 17, ~~all the limitations of which are incorporated herein by reference, wherein the data blocks containing altered redundant data~~ further comprising preferentially updating redundant data blocks that is are less likely to be altered again are preferentially updated.

19. (Currently Amended) A system for reducing data loss in a disk array comprising:
a storage unit operable for periodically storing redundant data into data blocks located on a spare disk;

a monitor operable for monitoring the disks in the array for predicted disk failures ~~to occur~~;

a directory operable for determining which of said data blocks comprise updated data blocks, said updated data blocks comprising ones of said data blocks that have received a write operation and a corresponding write operation to a corresponding redundant storage block has not been made ~~contain altered redundant data, wherein said altered redundant data comprises at least a portion of said redundant data that has been altered subsequent to an immediate previous time said redundant data was stored; and~~

a computer operable for updating only ~~portions of said~~ redundant storage blocks corresponding to said updated data blocks ~~data that has been altered; and~~

~~a controller operable for:~~

~~—————identifying data blocks of said data blocks that have not been updated recently relative to other data blocks of said data blocks that have been updated recently, and~~

~~—————updating said data blocks when said disk failures have occurred, wherein said updating of said data blocks comprises updating said data blocks that have not been updated recently prior to updating said data blocks that have been updated recently.~~

20. (Currently Amended) The system according to claim 19, ~~all the limitations of which are incorporated herein by reference,~~ wherein said directory is maintained based on a function disk failures monitored include disk failures that are predicted to occur.

21. (Cancelled).

22. (Currently Amended) The system according to claim 19, ~~all the limitations of which are incorporated herein by reference,~~ further comprising at least one replacement disk operable for storing reconstructed data previously stored on a failed disk.

23. (Currently Amended) The system according to claim 19, ~~all the limitations of which are incorporated herein by reference,~~ wherein if an amount of said updated data blocks exceeds a fraction of said data stored in said disk array, said computer is further operable for only updating said redundant storage blocks corresponding to said updated data blocks ~~said directory is operable for marking the recomputed redundant data in said directory.~~

24. (Currently Amended) The system according to claim 19, ~~all the limitations of which are incorporated herein by reference,~~ wherein said disk array comprises at least one a RAID array.

25. (Currently Amended) The system according to claim 19, ~~all the limitations of which are incorporated herein by reference,~~ ~~further comprising a controller operable for updating said redundant data whenever a load on said disk array is below a threshold value~~ wherein, whenever a load on said disk array is below a threshold value, said computer is further operable for only updating said redundant storage blocks corresponding to said updated data blocks.

26. (Currently Amended) The system according to claim 25, ~~all the limitations of which are incorporated herein by reference,~~ wherein said ~~controller~~ computer preferentially updates one of said redundant data blocks that is are less likely to be altered again.

27. (Cancelled).